

University of Groningen

Supersymmetry, black holes and holography in three dimensions

Alkaç, Gökhan

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:

2017

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Alkaç, G. (2017). *Supersymmetry, black holes and holography in three dimensions*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Stellingen behorende bij het proefschrift

Supersymmetry, Black Holes and Holography in Three Dimensions

Gökhan Alkaç, 20 October 2017

- Despite its relative simplicity, 3D gravity reveals interesting physical properties.

Chapter 1

- In 3D, it is possible to obtain unitary modifications of Einstein's gravity by adding higher derivative terms to the Lagrangian. However, the dual boundary field theory turns out to be non-unitary.

Chapter 2

- For 3D supergravity theories to admit supersymmetric solutions with a timelike translational Killing vector, at least four supercharges must be introduced.

Chapter 2

- New Massive Gravity possesses two different off-shell supersymmetric extensions with four supercharges. Unitarity around the AdS spacetime is preserved in only one of them.

Chapter 3

- The $\mathcal{N} = (1, 1)$ supersymmetric extension of New Massive Gravity admits supersymmetric solutions with null and timelike translational Killing vectors. The rotating hairy black hole and the logarithmic black hole are solutions of the theory. However, the Lifshitz black hole is not.

Chapter 4

- The theory defined by the purely quadratic part of New Massive Gravity admits asymptotically locally flat black hole solutions which are conformally flat. Decomposing its field equations into two tensorial structures, all the conformally flat solutions of the theory can be classified.

Chapter 5